DOCUMENT RESUME

ED 223 659 TM 820 762

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TITLE Anxiety Scale as a Retest Measure in College Courses.
PUB DATE [81]
NOTE 21p.; Paper presented at the Annual University of South Carolina Conference on Educational Issues and Research (3rd, Columbia, SC, 1981).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Affective Measures; Anxiety; Correlation; Higher Education; Hypothesis Testing; Questionnaires; Research Problems; *Socioeconomic Status; *Test Anxiety; Test Reliability; *Undergraduate Students
IDENTIFIERS *Alpert Haber Achievement Anxiety Test; *Test Retest Reliability

ABSTRACT

The study investigated statistically significant correlations between levels of test anxiety and socioeconomic status among college sophomores and juniors. The Anxiety Scale (Alpert and Haber) was administered to students in an educational psychology course. Administrations were conducted at a neutral time, 45 days prior to the final exam, and again immediately following a final exam. There were significant correlations between levels of socioeconomic status (SES) and levels of overall test anxiety. Possible usefulness of the Anxiety Scale in future research as a test-retest measure within larger groups of low or high SES subjects is discussed in the report. The scale's usefulness in instructional development with differing exam or grading formats, and in relation to equal educational opportunity are discussed. (DWH)

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ED223659

ANXIETY SCALE AS A RETEST MEASURE IN COLLEGE COURSES

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Presented at the Third Annual University of South Carolina
Conference on Educational Issues and Research

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ABSTRACT

Anxiety Scale (Alpert and Haber, 1966) was administered to 158 undergraduates 1) at a neutral time, and 2) after a final exam. Hypothesis that learning effects due to repeating the same questionnaire in the after-exam condition would show no statistically significant differences in levels of anxiety between the two test conditions was supported. Support for the hypothesis was a function of the number of students with low socioeconomic status (SES). The report discusses possible usefulness of the Anxiety Scale in future research as a test-retest measure within larger groups of low or high SES subjects, in instructional development with differing exam or grading formats, and in relation to issues about equal educational opportunity.

Anxiety Scale as a Retest Measure in College Courses

Shirley Langham-Johnson

Introduction

Review of recent research literature on test anxiety shows many studies in experimental psychology within controlled experimental settings and fewer studies of test anxiety within the schooling context. Notable exceptions in which research related to testing and motivation and anxiety has been done within classrooms include studies by Dillard, 1977; Wine, 1979; Maeher, 1977; and others.

Maeher (1977) discusses socioeconomic status in relation to test anxiety, but does not compare test and nontest conditions in relation to levels of test anxiety. Dillard et al. (1977) report efficacy for test-wiseness in reducing levels of test anxiety among lower SES students. Wine reports identifiable differences in student's observable behaviors for students in an art class, when the art class immediately preceded another class in which a test was to be given to those students (Wine, 1979).

Alpert and Haber (1966) in a now classic study demonstrated that achievement anxiety does not have significant influence on basic aptitude. While it has not been shown conclusively that academic gains can be significantly decreased by undue negative affect related to achievement anxiety, it seems reasonable to consider how negative affect with repeated testing may influence levels of test anxiety.

In their research with the Anxiety Scale, Alpert and Haber (1966) looked at relationships between measures of general anxiety and specific (test) anxiety as predictors of academic performance; the direction of

the effects of anxiety upon academic achievement performance, and the like. Haber's research established the greater efficacy of a specific anxiety scale over a general one, for predicting effects of anxiety on achievement testing (see Taylor, 1951, for an example of a general scale).

Although this present study was not concerned with relationships between anxiety and academic achievement, it may be noted that Haber (1966) and his followers also established that test anxiety does not reduce basic aptitude. Test performance has been shown to be a function of many variables and specific anxiety scales are able to account for variance in performance other than that accounted for by a measure of aptitude. On the basis of their data, it has been concluded that relationships between anxiety scales and measures of aptitude should not be used as a vehicle for rationalizing or justifying poor academic performance.

However, no conclusions were reached explaining relationships between anxiety scales and measures of achievement on the basis that achievement scores may be affected by anxiety. This present study was not concerned with achievement or aptitude, but looked only at possible relationships between levels of SES and test anxiety.

Purpose of the study reported here was to investigate possible relationships between levels of test anxiety and socioeconomic status among 155 college undergraduates in Educational Psychology courses.

This present study looked at whether levels of anxiety immediately after taking a final exam might exceed the levels reported by students at a neutral time, when an exam is not being taken and relationships between levels of anxiety and socioeconomic status.

Since it is a common experience within academia to experience anxiety while taking a final examination, it might reasonably be asked, "Why does this need to be studied?" There are at least three reasons.

First, it was conjectured that students of lower socioeconomic status (SES) may experience greater increases in levels of anxiety (ANX) between the neutral, nontest time than students from higher socioeconomic levels. Lack of financial security and the functions of academics in securing an income might be associated with higher achievement anxiety in lower SES students.

Second, it was not known whether the Anxiety Scale of Alpert and Haber would be a reliable measure for testing various hypotheses subordinate to this general premise about possible relationships between levels of test anxiety and SES among college students. If students memorized their answers on the questionnaire taken in the neutral nontest condition, there would be no significant differences in anxiety level as reflected by the test anxiety questionnaire.

As discussed by Campbell and Stanley (1963) learning effects might obscure the actual state of anxiety within students following the final examination. In that case, it would be expected that there would be no statistically significant differences between the Anxiety Scale taken during a neutral, nonexamination time and after a final exam. Even though students actually experience higher levels of anxiety after taking a final exam, this effect could be obscured by the learning effects related to having repeated the same form of the Anxiety Scale questionnaire.

A test anxiety measure that does reflect changes in anxiety level in relation to test conditions (neutral or after-exam) despite repeated use of the same questionnaire form could make it possible to identify relationships between instructional methods across courses. That is, groups of students in courses using differing instructional formats could be retested with the Anxiety Scale to determine relationships between levels of test anxiety and changes in course format; such as, course requirements, number and kinds of quizzes, as well as other instructional practices.

Third, within this same perspective, the Anxiety Scale might be used to look at possible effects on students of varying instruction and testing, and might be useful in addressing other problems related to anxiety.

Method and Material

Subjects. In this study subjects were sophomores and juniors within sections of Educational Psychology courses. Within the study there were a total of 158 students in two sub-groups; Group 1 included 77 and Group 2, 81. Students attended sections of courses taught by the same instructor. Instructional format included four regular quizzes and regularly scheduled final examination. All course tests were multiple choice. Instructional format and course requirements were intended to minimize achievement anxiety among the students. This included study guides, reviews preceding tests, etc.

Design. The 20-item Anxiety Scale questionnaire (Alpert & Haber, 1966) was administered in a neutral, nontest condition (Time 1, A) about 45 days prior to the final examination in the course. The questionnaire was repeated again using the same form immediately after

students had completed the final examination in the course. If students did not have time to begin the questionnaire before the end of the scheduled period of time for taking the exam they were given the option of staying after the examination period to complete the questionnaire or not to complete it at all.

The main focus of the study was to determine if there might be statistically significant correlations between socioeconomic status (SES) and levels of test anxiety (ANX) for this sample and whether levels of anxiety might be stable across the two testing conditions.

It was hypothesized that there would be no significant differences between the two testing conditions (Time 1, A neutral and Time 2, B after-exam). This approach was based on two naive conjectures: 1) that text anxiety may be a stable trait or 2) may be stabilized by retaking the same form of the questionnaire repeatedly (learning effects).

The question addressed was "will differences between the two anxiety conditions, neutral and after-exam, be shown despite possible "learning" effects by administering the same questionnaire again within 40 days?" In line with this question, the study addressed the following null hypotheses:

Hypothesis 1:

For each individual subject there is no significant correlation between level of socioeconomic status (SES) (low, medium, or high) and level of overall test anxiety scores (mean for the questionnaire overall (high, medium, or low) for condition A (neutral time) and condition B (taking the questionnaire immediately following the final examination).

Hypothesis 2:

For the total sample of subjects there is no significant difference between mean level of test anxiety for condition A (neutral, time 1) and condition B (after exam, time 2) for each level of SES (high, medium or low) or for condition A (the neutral time or for condition B (after exam) considered separately.

Hypothesis 3:

For each item on the Anxiety Scale across the total sample of subjects there is no significant relationship between levels of socioeconomic status and mean levels of anxiety on each individual item of the Anxiety Scale, using A or B as the grouping variable.

Hypothesis 4:

There is no significant difference between the two testing conditions (A or B, neutral or after-exam) for each individual subject).

Analysis of Data

A general linear models procedure was used (SAS) including two-way T tests for the significant levels of interaction between SES and ANX levels using Spearman's rank correlation coefficient and Duncan's multiple range test for analysis of variance. Changes in levels of anxiety score in the after-exam condition were treated as the dependent variable. Design of two procedures for analysis of data are modeled below:

		SES		
		low	med	hi
ANX Level	low			
	med			
	hi			

		ANX	SES
	A	low	
		med	
neutral		hi	
	B	low	
after		med	
exam		hi	

Anxiety Scale. Levels of students' test anxiety were determined by administering a combined version of the facilitating and debilitating format of the Anxiety Scales (Alpert and Haber, 1966) drawn from Mander and Sarensen, 1952. Alpert and Haber established these scales as having test-retest reliability for a ten week interval at .83 for the facilitating version and 187 for the debilitating version (e.g., the negative version: "Taking tests makes me nervous, so I can't think of what I really know."). In combination, these negative and positive items have a reliability correlate of .64 with an N of 40 and were shown by Alpert and Haber to predict academic achievement significantly at the .05 level of significance.

Because the Anxiety Scale is continuous (1-5) and the economic level discrete (high, medium, low) the Anxiety Scale was converted to discrete elements (1, 2 = low, 3 = medium, 4, 5 = high). Statistically high, medium and low within both categories (ANX and SES) were dealt with as 1, 2, 3.

Socioeconomic status was determined in relation to annual income level of self or parents as reported by the student within the following general ranges: $2,000 - $10,000, low; $10,000 - $20,000, medium; and $20,000 and up, high).

Results

Hypothesis 1: In group 1, for individuals, there were significant correlations between levels of socioeconomic status (low, medium, high) and levels of overall test anxiety (means for the Anxiety Scale overall were identified as high, medium and low) for conditions A and B.

Differences in anxiety levels between the neutral condition and the after-exam condition within group 1 (N=81) were slight. This is presented in Figure 1. Majority of students within group 1 were medium level SES with high anxiety levels (79% or 64). Highest anxiety among the group with high SES accounted for 17% (14). This is presented in Figure 2.

Group 1 did not have a statistically significant number of lower SES students. The lack of large differences in levels of test anxiety between the neutral condition in group 1 and the after-exam condition may have been related to the paucity of low SES students within group 1. Correlation between ANX and SES overall in group 1 (N=81) was 24 for Spearman R PHO = 0 α .05.

Hypothesis 1 was not tested in group 2, because of missing SS number for a subgroup. These may be supplied later.

Hypothesis 2, for overall group means: In group 2 there were significant increases in levels of test anxiety in the after exam condition. Within group 2 there were more low SES students (42 or 54%) than in group 1.

Correlation between levels of ANX and SES within group 2 (N=88) with 42 low SES students were statistically significant: Spearman's R .415 with P > HO = 0 α .05. Null hypothesis two was rejected in favor of the hypothesis that level of socioeconomic status may make a difference in level of anxiety. These findings are located in figure 3.

Within group 2 (N=88) statistically significant differences in levels of ANX between the two conditions, A and B (neutral and after-exam) were shown. Analysis of data produced an F of 8.61 in variability in means on the Anxiety Scale between the two administration times (neutral

and after-exam). Source of these differences were within the neutral time, among low SES students. However, it was found that the high ANX reported in the neutral condition related to low SES was not statistically significant.

Also within group 2 (N=77) 89% of students had a medium level of anxiety in the after-exam condition (B). Of these, 49% (38) were low SES, 24% (19) were middle SES and 15% (19) were high SES. Fifty-four percent in this group were low SES (42), four of whom had the highest level of anxiety. Of the total group of 77 only 4 had high levels of anxiety (5%). And medium levels of anxiety were associated with the majority of the middle SES. Lowest SES students constituted 54% of this group (42 students). This is presented in Figure 3.

A closer look at the differences in ANX levels between the neutral (time 1) condition and the after-exam (time 2) condition shows that within group 2 (N=88) it is the lowest SES subgroup that accounts for the differences in overall levels of ANX between the two times, the neutral condition and the after-exam condition. This data is in Figure 6.

Hypotheses 3 and 4 dealt with individual differences in items on the Anxiety Scale and among individuals between the two testing conditions. Analysis of this data is still in progress. It is unlikely that this analysis will contribute any crucial information to the findings about the more general questions addressed by hypotheses 1 and 2 that deal with differences in overall group relationships.

Discussion

Because of the particular makeup of the two groups studied, results of this study are somewhat inconclusive. However, the study

showed correlations between anxiety and socioeconomic levels that suggest lines of thought to be addressed in future studies:

1. Socioeconomic level may be an important function of test anxiety within certain individuals, but not in others. Identifying such individuals might be useful in equalizing educational opportunities, modifying instructional formats, designing counseling strategies, etc.
2. In this study, among the high SES students, levels of test anxiety appeared to be more stable between time 1 (taking the Anxiety Scale at a neutral, nontest time) and time 2 (immediately following the final exam). Future studies might address these differences with a comparison of low SES and high SES within the two test conditions, with more adequately matched groups.
3. Learning effects in taking the same form of the Anxiety Scale in this study did not appear to obscure increases in anxiety felt by students while taking the final exam. This suggests the Anxiety Scale might be a useful instrument in future research as a retest measure, looking at:
   - possible overall differences in levels of test anxiety between groups or individuals of low and high SES
   - using populations made up solely of low or high SES, rather than mixed groups as was done in this study
   - possible anxiety effects of varying instructional formats (e.g., quizzes versus a midterm with or without a final exam; quizzes with a take home final; no midterm or quizzes in combination with a final; objective

versus essay; weighting of grades in course requirements, and the like.

. comparisons of overall group differences in anxiety levels between neutral and after-exam conditions between groups within different academic disciplines (e.g., undergraduates at the same level in science courses versus philosophy courses).

Findings along the lines suggested above could be useful for instructional development, for addressing certain issues that concern vocational counselors, in counseling students about achievement anxiety, and other issues related to students' mental health within education.

The correlation in levels of socioeconomic status associated with levels of anxiety suggest the possibility of future studies concerned with equality of educational opportunity. Equal opportunity in education may be more complex than simply the opportunity to take the same test under the same conditions or to be subjected to the same course format and requirements. If low SES in combination with high ANX is found to function with low GPA to accelerate levels of anxiety, then a closer look at the effects of these interactions on individuals (e.g., intervention, interviews, counseling settings, etc.) might also be indicated by subsequent research along these lines.

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Figure 1

Differences in Anxiety Levels
Group 1

Time	X	SD	t	DF	Prob of ———
A Neutral N 40	2.96	.32	-.45	80.7	.65
B after exam N 43	3.00	.37	-.44	81.	.65

For H_0 variances equal, F = 1.31 with 42 and 39 DF

P F = .40 α .05

DF - the degrees of freedom

Difference slight between halves of group 1, F is not statistically significant within whole group, therefore accept null hypothesis H_0 of no significant difference between the two testing conditions

Figure 2

Group 1
Times (Neutral and After Final Exam)

		1	2	3	Total
	low ANX 2		0	1 1.23%	1 1.2%
ANXIETY LEVEL	medium ANX 3	2 2.4%	0	64 79.01%	66 81.4%
	High ANX 4	0	0	14 17.28%	14 17.28%
Total		2		79	81
%		2.47%		97.53	100

Anxiety correlation between level and SES Group 1
N=81

	X	SD	Md	Min.	Max.
ANX	2.98	.347	2.94	2.16	3.9
SES	4.8	.62	5.0	1.0	5.0

Spearman Corre. SES X ANX = .24
p HO = 0 α .05

Figure 3

Group 2
Times (Neutral and After Final Exam)

		Economic Status low 1	medium 2	high 3	Total
	low ANX 2	4 5.19%	0	0	4 5%
ANXIETY LEVEL	medium ANX 3	38 49.3%	19 24.6%	12 15.58%	69 89%
	High ANX 4	0	1 1.3%	3 3.9%	4 5%
Total		42	20	15	77
%		54.55	25.97	19.48	100

Correlation between anxiety level and SES Group 2

A Time neutral condition N=88

	X	SD	Md	Min.	Max.
ANX	3.07	.309	3.0	2.4	3.8
SES	3.2	1.2	4.0	0	4.0

Spearman Corre. SES X ANX = .166
p 1R1/HO: α .05

Relationships between anxiety SES Group 2

B After exam N = 77

	X	SD	Md	Min.	Max.
ANX	2.77	.34	2.75	1.8	3.6
SES	2.48	.99	2.0	1.0	4.0

Spearman Corre. SES X ANX = .415
p HO = 0 α .05

Figure 4

Group 2
Differences Between ANX Levels

SS	M2	F	PR > F	R^2	SD	ANX X
4.03	.807	8.61	.0001	.2	.302	2.8
10.4						
14.4	.093					

Source of Difference

TIME 1

DF	Type 1 SS	F	PR > F	DF	Type IV SS	F	PR F
1	1.71	18.3	.0001	1	.38	4.09	.04

ECONOMIC STATUS

DF	Type 1 SS	F	PR > F	DF	Type IV SS	F	PR F
1	1.71	10.2	.0001	2	.64	3.41	.03

SES AND TIME OF ANX

DF	Type 1 SS	F	PR > F	DF	Type IV SS	F	PR F
2	.39	2.10	.12	2	.39	2.10	.12

4/M